Space Weather Forecast

Issued on Thursday, 04 January 2024 at 13:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate flares likely with a slight chance of isolated Strong flares. S1 Proton Storming continues, reducing risk from day 2.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate with a single moderate-class flare observed at 04/0155 UTC from the complex spot in the northeast. There are five sunspot regions on the disc. The most notable group remains the aforementioned spot in the northeast, which was the source of an X5.0 flare on 31 Dec. This spot contains a small delta spot in its north-south aligned magnetically complex leading portion. The remaining spots are all smaller and simpler at this time, with the emergence of a new region in the northeast.

A number of coronal mass ejections were visible in imagery, however these have all been assessed as being off the Earth-Sun line with no Earth-directed coronal mass ejection occurring.

Solar Wind / Geomagnetic: Solar winds were indicative of a weak coronal hole fast wind, with an embedded coronal mass ejection glancing blow at 03/1420 UTC. Speeds slightly elevated. Interplanetary Magnetic Field (IMF), was initially weak, but increased to moderate, peaking at 03/1425 UTC, before gradually declining back to weak levels. The north-south component varied weakly throughout, with one notable period of persistently negative between 03/1800-2100 UTC, before becoming largely positive. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) has been on an increasing trend, with observed values above the S1/Minor Storm threshold since 03/2005 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally moderate activity is considered likely, with isolated Moderate-class flares and a slight chance of a Strong-class flare.

Solar Wind / Geomagnetic Activity: No coronal mass ejections feature in the forecast period. The fast winds from a coronal hole are slightly elevated, and are expected to wane, perhaps falling to background levels through days 2-3 (05-06 Jan). The next expected enhancement in solar winds is from the high speed stream of another coronal hole, which may begin to arrive from late day 3 or into day 4 (06-07 Jan), with slightly elevated solar wind speeds.

Quiet geomagnetic activity is initially expected, with a chance of Unsettled periods. From day 3 (06 Jan) onward there is an increasing chance of Unsettled or Active periods and a slight chance of isolated G1/Minor Storm intervals upon the arrival of coronal hole 89.

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) is above the S1/Minor Storm threshold in response to recent significant flare activity. S1 storm levels are expected to continue on day 1 (04 Jan), with a chance of continuing into day 2 (05 Jan), then a slight chance on subsequent days, dependent on any further notable flares occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	5	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	55	55	55	55
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	40	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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